I claim:

1. method for deriving at least three audio output signals from two input audio signals, comprising

deriving four audio signals from said two input audio signals, wherein the four audio signals are derived with a passive matrix that produces two pairs of audio signals in response to two audio signals, a first pair of derived audio signals representing directions lying on a first axis and a second pair of derived audio signals representing directions lying on a second axis, said first and second axes being substantially mutually orthogonal to each other,

processing each of said pairs of derived audio signals to produce respective first and second pairs of intermediate audio signals wherein the magnitudes of the relative amplitudes of the audio signals in each pair of intermediate audio signals are urged toward equality,

producing a first output signal representing a first direction lying on the axis of the pair of derived audio signals from which the first pair of intermediate signals are produced, said first output signal being produced at least by combining, with the same polarity, at least a component of each of said second pair of intermediate audio signals,

producing a second output signal representing a second direction lying on the axis of the pair of derived audio signals from which the first pair of intermediate signals are produced, said second output signal being produced at least by combining, with the opposite polarity, at least a component of each of said second pair of intermediate audio signals,

producing a third output signal representing a first direction lying on the axis of the pair of derived audio signals from which the second pair of intermediate signals are produced, said third output signal being produced at least by combining, with the same polarity or the opposite polarity, at least a component of each of said first pair of intermediate audio signals, and, optionally,

producing a fourth output signal representing a second direction lying on the axis of said pair of derived audio signals from which the second pair of intermediate signals are produced, said third output signal being produced at least by combining, with the opposite polarity, if the third output signal is produced by combining with the same polarity, or at least by combining with the same polarity, if the third output signal is produced by

combining with the opposite polarity, at least a component of each of said first pair of intermediate audio signals.

2. The method of claim 1 wherein

producing a first output signal includes combining a component of each of said second pair of intermediate audio signals with a passive matrix audio signal representing said first direction, said component constituting a cancellation signal opposing said passive matrix audio signal,

producing a second output signal includes combining a component of each of said second pair of intermediate audio signals with a passive matrix audio signal representing said second direction, said component constituting a cancellation signal opposing said passive matrix audio signal,

producing a third output signal includes combining a component of each of said first pair of intermediate audio signals with a passive matrix audio signal representing said third direction, said component constituting a cancellation signal opposing said passive matrix audio signal, and, optionally,

producing a fourth output signal includes combining a component of each of said first pair of intermediate audio signals with a passive matrix audio signal representing said fourth direction, said component constituting a cancellation signal opposing said passive matrix audio signal.

3. The method of claim 2 wherein the matrix audio signals representing said first, second, third and, optionally, fourth directions, respectively, are produced by said passive matrix.

4. The method of claim 2 wherein the passive matrix audio signals representing said first, second, third and fourth directions, respectively, are produced in a plurality of linear combiners that also combine the passive matrix audio signals with ones of said components of signals.

5. The method of claim 1 wherein the respective output signals are produced by combining said pairs of intermediate signals.

6. The method of any one of claims 1, 2 or 5 wherein said processing includes feeding back each pair of intermediate audio signals for use in controlling the relative amplitudes of the respective pair of intermediate audio signals.

7. The method of claim 6 wherein said processing includes applying each derived audio signal to a respective variable gain circuit, wherein the gain of each variable gain circuit associated with each pair of derived audio signals is controlled in response to the amplitudes of the outputs of the variable gain circuits in the respective pair.

8. The method of claim 7 wherein each variable gain circuit includes a voltage controlled amplifier (VCA), having a gain g, in combination with a subtractive combiner, the resulting variable-gain-circuit gain is (1-g), and said cancellation signals are taken from the outputs of said voltage controlled amplifiers.

9. The method of claim 7 wherein each variable gain circuit comprises a voltage controlled amplifier (VCA), having a gain g, the resulting variable-gain-circuit gain is g, and said cancellation signals are taken from the outputs of said voltage controlled amplifiers.

10. The method of claim 7 wherein the gain of each variable gain circuit is low for quiescent input signal conditions, such that said signal outputs are substantially the signals produced by said passive matrix.

11. The method of claim 7 wherein the gain of each variable gain circuit is high for quiescent input signal conditions, such that said signal outputs are substantially the signals produced by said passive matrix.

12. The method of claim 7 wherein the gains of the variable gain circuits associated with each pair of derived audio signals are controlled by applying the outputs of the respective variable gain circuits in the pair to a magnitude comparator that generates a control signal that controls the gains of the variable gain circuits.

13. The method of claim 12 wherein the respective magnitude comparators control the gains of the variable gain circuits associated with the pairs of derived audio signals such that, for some input signal conditions, an increase in the magnitude of the output of one variable gain circuit with respect to the other causes a decrease in the gain of the variable gain circuit having the increased output.

14. The method of claim 13 wherein the respective magnitude comparators control the gains of the variable gain circuits associated with the pairs of derived audio signals such that, for some input signal conditions, an increase in the magnitude of the output of one variable gain circuit with respect to the other also causes substantially no change in the gain of the variable gain circuit not having the increased output.

15. The method of claim 13 wherein the respective magnitude comparators control the gains of the variable gain circuits associated with the pairs of derived audio signals such that, for some input signal conditions, an increase in the magnitude of the output of one variable gain circuit with respect to the other also causes the product of the gains of the variable gain circuits to be substantially constant.

16. The method of claim 12 wherein the respective magnitude comparators control the gains of the variable gain circuits associated with the pairs of derived audio signals such that, for some input signal conditions, an increase in the magnitude of the output of one variable gain circuit with respect to the other causes an increase in the gain of the variable gain circuit having the increased output.

17. The method of claim 16 wherein the respective magnitude comparators control the gains of the variable gain circuits associated with the pairs of derived audio signals such that, for some input signal conditions, an increase in the magnitude of the output of one variable gain circuit with respect to the other also causes substantially no change in the gain of the variable gain circuit not having the increased output.

18. The method of claim 16 wherein the respective magnitude comparators control the gains of the variable gain circuits associated with the pairs of derived audio signals such that, for some input signal conditions, an increase in the magnitude of the output of one variable gain circuit with respect to the other also causes the product of the gains of the variable gain circuits to be substantially constant.

19. The method of claim 12 wherein the gain of said variable gain circuits in dB are linear functions of their control voltages, each magnitude comparator has finite gain and the output of each variable gain circuit is applied to a magnitude comparator via a rectifier that delivers an output signal proportional to the logarithm of its input.

20. The method of claim 19 wherein each rectifier is preceded by a filter having a response that attenuates low frequencies and very high frequencies and provides a gently rising response over the middle of the audible range.

21. The method of claim 12 further comprising

deriving one or more additional control signals from the two control signals that control the variable gain circuits associated with each pair of passive matrix audio signals, wherein said one or more additional control signals are each derived by modifying one or both control signals and generating the lesser or greater of a unmodified control signal and a modified control signal or of two modified control signals.

22. The method of claim 21 wherein one or both of said control signals are modified by polarity inverting, amplitude offsetting, amplitude scaling and/or non-linearly processing the respective signal.

23. The method of claim 21 further comprising one or more additional variable gain circuits receiving as an input the combination of two of said plurality of cancellation signals or the combination of two passive matrix signals, wherein said one or more additional control signals control respective ones of said one or more additional variable gain circuits such that the circuit's gain rises to a maximum when said input signals represent a direction other than the directions lying on said first and second axes, and

generating one or more additional cancellation signals by controlling said one or more additional variable gain circuits with a respective one of said one or more additional control signals.

24. The method of claim 23 wherein at least five output signals are produced by combining each of at least five passive matrix audio signals with two or more of said plurality of cancellation signals and said one or more additional cancellation signals, the cancellation signals opposing each passive matrix audio signal such that the passive matrix audio signal is substantially cancelled by the cancellation signals when said input audio signals represent signals associated with directions other than the direction represented by the passive matrix audio signal.

25. The method of claim 12 wherein the magnitude of the audio signals in a first pair of intermediate audio signals may be represented by

the magnitude of $[(L_t+R_t)*(1-g_c)]$, or, equivalently the magnitude of $[(L_t+R_t)*(h_c)]$, and

the magnitude of $[(L_t-R_t)*(1-g_s)]$, or equivalently, the magnitude of $[(L_t-R_t)*(h_s)]$,

and the magnitude of the audio signals in the other pair of intermediate audio signals may be represented by

the magnitude of [L_t*(1-g_l)], or, equivalently, the magnitude of [L_t*(h_l)], and

the magnitude of [R_t*(1-g_r)], or, equivalently, the magnitude of [R_t*(h_r)],

where L_t and R_t are one pair of audio signals produced by said passive matrix, L_t+R_t and L_t-R_t are the other pair of audio signals produced by said passive matrix, (1-g_c) and h_c are the gain of a variable gain circuit associated with the L_t+R_t output of the passive matrix, (1-g_s) and h_s are the gain of a variable gain circuit associated with the L_t-R_t output of the passive matrix, (1-g_l) and h_l are the gain of a variable gain circuit associated with the L_t output of the passive matrix, and (1-g_r) and h_r are the gain of a variable gain circuit associated with the R_t output of the passive matrix.

26. A method for deriving at least three audio signals, each associated with a direction, from two input audio signals, comprising

generating with a passive matrix in response to said two input audio signals a plurality of passive matrix signals including two pairs of passive matrix audio signals, a first pair of passive matrix audio signals representing directions lying on a first axis and a second pair of passive matrix audio signals representing directions lying on a second axis, said first and second axes being substantially mutually orthogonal to each other,

processing each of said pairs of passive matrix audio signals to produce respective first and second pairs of intermediate audio signals such that the magnitudes of the relative amplitudes of the audio signals in each pair of intermediate audio signals are urged toward equality,

deriving a plurality of cancellation signals from said pairs of intermediate audio signals,

producing at least three output signals by combining each of at least three passive matrix audio signals with two or more of said plurality of cancellation signals, the

cancellation signals opposing each passive matrix audio signal such that the passive matrix audio signal is substantially cancelled by the cancellation signals when said input audio signals represent signals associated with directions other than the direction represented by the passive matrix audio signal.

27. The method of claim 26 wherein said processing includes feeding back each pair of intermediate audio signals for use in controlling the relative amplitudes of the respective pair of intermediate audio signals.

28. The method of claim 27 wherein said processing includes applying each passive matrix signal in said two pairs of passive matrix audio signals to a respective variable gain circuit, each circuit including a voltage controlled amplifier (VCA), having a gain g, in combination with a subtractive combiner, wherein the resulting variable-gain-circuit gain is (1-g) and said cancellation signals are taken from the outputs of said voltage controlled amplifiers.

29. The method of claim 28 wherein the gains of the variable gain circuits associated with each pair of passive matrix audio signals are controlled by applying the outputs of the respective variable gain circuits of each pair to a magnitude comparator that generates a control signal that controls the gains of the variable gain circuits.

30. The method of claim 29 wherein the outputs of the respective variable gain circuit of each pair are applied to a magnitude comparator via a rectifier, the rectifiers deliver signals proportional to the logarithm of their inputs, the comparator has finite gain, and the VCA gains in dB are linear functions of their control voltages.

31. The method of claim 29 further comprising

deriving one or more additional control signals from the two control signals that control the variable gain circuits associated with each pair of passive matrix audio signals,

wherein said one or more additional control signals are each derived by modifying one or both control signals and generating the lesser or greater of a unmodified control signal and a modified control signal or of two modified control signals.

32. The method of claim 31 wherein one or both of said control signals are modified by polarity inverting, amplitude offsetting, amplitude scaling and/or non-linearly processing the respective signal.

33. The method of claim 31 further comprising one or more additional variable gain circuits receiving as an input the combination of two of said plurality of cancellation signals or the combination of two passive matrix signals, wherein said one or more additional control signals control respective ones of said one or more additional variable gain circuits such that the circuit's gain rises to a maximum when said input signals represent a direction other than the directions lying on said first and second axes, and

generating one or more additional cancellation signals by controlling said one or more additional variable gain circuits with a respective one of said one or more additional control signals.

34. The method of claim 33 wherein at least five output signals are produced by combining each of at least five passive matrix audio signals with two or more of said plurality of cancellation signals and said one or more additional cancellation signals, the cancellation signals opposing each passive matrix audio signal such that the passive matrix audio signal is substantially cancelled by the cancellation signals when said input audio signals represent signals associated with directions other than the direction represented by the passive matrix audio signal.